the chief reasons for Dr. van't Hoff's welcome visit to the United States in 1901.

THEODORE W. RICHARDS.

SOCIETIES AND ACADEMIES.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE fifty-second annual meeting of the American Association for the Advancement of Science, and the first of the Convocation Week meetings, will be held in Washington, D. C., December 27, 1902, to January 3, 1903. The retiring president is Professor Asaph Hall, U.S.N., and the president elect, President Ira Remsen, Johns Hopkins University. The permanent secretary is Dr. L. O. Howard, Cosmos Club, Washington, D. C., and the local secretary, Dr. Marcus Benjamin, Columbian University, Washington, D. C. President Roosevelt is honorary president of the local committee. The preliminary program with information in regard to hotel headquarters, railway rates, etc., will be found in the issue of SCIENCE for November 21. The following scientific societies will meet at Washington in affiliation with the Association:

The American Anthropological Association will hold its first regular meeting during Convocation Week in affiliation with Section H of the A. A. A. S. President, W J McGee; secretary, George A. Dorsey, Field Columbian Museum, Chicago, Ill.

The American Chemical Society will meet on December 29 and 30. President, Ira Remsen; secretary, A. C. Hale, 352A Hancock street, Brooklyn, N. Y.

The American Folk-lore Society will meet in affiliation with Section H of the A. A. A. S. President, George A. Dorsey; vice-presidents, J. Walter Fewkes, James Mooney; secretary, W. W. Newell, Cambridge, Mass.

The American Microscopical Society will probably hold a business meeting on December 29. President, E. A. Birge, Madison, Wis.; secretary, H. B. Ward, University of Nebraska, Lincoln, Nebr.

American Morphological Society will meet on December 30 and 31. President, H. C. Bumpus; vice-president, G. H. Parker; secretary and treasurer, M. M. Metcalf, Woman's College, Baltimore, Md.

The American Philosophical Association will meet on December 30 and 31 and January 1. Secretary, H. N. Gardiner, Northampton, Mass.

The American Physical Society will meet in affiliation with Section B of the A. A. A. S. President, Albert A. Michelson; secretary, Ernest Merritt, Cornell University, Ithaca, N. Y.

The American Physiological Society will meet on December 30 and 31. President, R. H. Chittenden; secretary, F. S. Lee, Columbia University, New York, N. Y.

American Psychological Association will meet on December 30 and 31 and January 1. President, E. A. Sanford; secretary and treasurer, Livingston Farrand, Columbia University, New York, N. Y.

American Society of Naturalists will meet on December 30 and 31. President, J. McK. Cattell; vice-presidents, C. D. Walcott, L. O. Howard, D. P. Penhallow; secretary, R. G. Harrison, Johns Hopkins University, Baltimore, Md.

Association of American Anatomists will meet on December 30 and 31. President, G. S. Huntington; vice-president, D. S. Lamb; secretary and treasurer, G. Carl Huber, University of Michigan, Ann Arbor, Mich.

Association of Economic Entomologists will meet on December 26 and 27. President, E. P. Felt; secretary, A. L. Quaintance, College Park, Md.

Astronomical and Astrophysical Society of America will meet during Convocation Week, in affiliation with Section A of the A. A. A. S. President, Simon Newcomb; secretary, George C. Comstock, University of Wisconsin, Madison, Wis.

Botanical Society of America will meet on December 31 and January 1. President, B. T. Galloway; secretary, D. T. MacDougal, New York City.

Botanists of the Central and Western States will meet on December 30. Committee in charge of the meeting, John M. Coulter, University of Chicago; D. M. Mottier, University of Indiana, Bloomington, Ind.; Conway MacMillan, University of Minnesota, Minneapolis, Minn.

Geological Society of America will meet on December 29, 30 and 31. President, N. H. Winchell; vice-presidents, S. F. Emmons, J. C. Branner; secretary, H. L. Fairchild, University of Rochester, Rochester, N. Y.

The National Geographic Society will hold a meeting during Convocation Week. President, A. Graham Bell; vice-president, W J McGee; secretary, A. J. Henry, U. S. Weather Bureau, Washington, D. C.

Naturalists of the Central States will meet on December 30 and 31. Chairman, S. A. Forbes; secretary, C. B. Davenport, University of Chicago, Chicago, Ill.

Society of American Bacteriologists will meet on December 30 and 31. President, H. W. Conn; vice-president, James Carroll; secretary, E. O. Jordan, University of Chicago, Chicago, Ill.; council, W. H. Welch, Theobald Smith, H. L. Russell, Chester, Pa.

Society for Plant Morphology and Physiology will meet during Convocation Week. President, V. M. Spalding; vice-president, B. D. Halsted; secretary and treasurer, W. F. Ganong, Smith College, Northampton, Mass.

Society for the Promotion of Agricultural Science will meet during Convocation Week. President, W. H. Jordan; secretary, F. M. Webster, Urbana, Ill.

Zoologists of the Central and Western States will meet during Convocation Week. President, C. B. Davenport, University of Chicago.

SECTION OF GEOLOGY AND MINERALOGY. NEW YORK ACADEMY OF SCIENCES.

AT the meeting of the Section at the American Museum of Natural History on October 20, the following program was presented:

Wallace Goold Levison exhibited to the Section four specimens of gneiss obtained from the bed-rock in certain deep excavations at the southern end of Manhattan Island. One of these was collected July 20, 1902, from a depth of fifty feet below the surface at the corner of Broad and Exchange Streets; the second was collected in the excavations at 40 Exchange Place, forty-five feet below the surface, on July 25; two others were collected at 43–49 Exchange Place, forty-five feet below the surface, on July 25. Mr. Levison also showed specimens of serpentine from boulders found on June 19 in the excavations for the Stock Exchange building on Broad Street, between forty and sixty feet below the surface.

In the absence of the author, the paper by Professor William H. Hobbs was read in somewhat condensed form by the Secretary of the Section. The paper was accompanied by a wealth of detailed observations too extensive for reproduction, but a summary of his conclusions is as follows:

In his introduction the author called attention to the unusual opportunities now offered for studying the geology of Manhattan Island through the numerous great engineering projects now being carried forward. The waterways surrounding Manhattan Island are deep cañons, with a depth of nearly 200 feet in the East River and 300 feet or more in the North River, now partly filled with drift deposits and depending on the velocity of the tidal currents.

In 1865 Stevens advanced the theory that the river channels were along lines of faults ('longitudinal and transverse fractures'). Newberry regarded the East River as the lowest reach of the Housatonic River before it discharged its waters into the Hudson, which was then the outlet of the Laurentian series of lakes, and he considered the Harlem River with Spuyten Duyvil Creek a smaller tributary of the Hudson.

Dana believed that the relatively easy solution of certain beds of limestone determined the position of the river channels. This view of Dana's has been supported by Kemp and Merrill, while Gratacap rejects the theory advanced by Stevens.

Professor Hobbs finds that no correspondence can be established between the directions of the belts of limestone or dolomite and of the New York water front, except within the stretch from Kingsbridge to Macombs Dam Bridge. Along this line too the observed facts point to the occurrence of a narrow strip of limestone dropped down between nearly vertical faults. The sections of the Harlem River which are furnished by the bridges across it show clearly that it is not a simple erosion valley resulting from cutting by the stream. The bed of the stream is marked by sudden change of level, and the Harlem seems to have chosen its course quite independently of the position of ridges of the harder gneiss. Under the East River limestone has been found at but two localities—under the channel east of Blackwells Island and in one of the drill holes underneath the Manhattan pier of East River Bridge No. 3. The limestone east of Blackwells Island is enclosed between parallel fault walls, and appears to have been dropped down along them. The numerous

occurrences, however, of gneiss and gneiss only along, in and under the East River leaves little doubt that the main portion of the bed is composed of this rock.

Regarding the bed-rock beneath the North River, comparatively little is known, but the origin of its channel is sufficiently accounted for by its position along the contact of the Newark system with the crystallines. This contact seems surely to be a fault-border on account of its markedly rectilinear extension, the great scarp of basalt, the much inferior position of the newer terranes, and the evidence derived from the boring along the route of the proposed tunnels of the Pennsylvania, New York and Long Island railroad company.

The author holds that the directions of the channels of Spuyten Duyvil Creek and Harlem and East Rivers have been determined largely by lines of jointing and displacement. Manhattan Island borders directly upon the Newark area, in which the existence of a network of faults has been established by the work of several observers, and the network probably extends beyond the limits of the area. The striking rectilinear outlines of the island, especially of the northern half of it, and its topographic development are favorable to the view that it represents an orographic block left standing between down-thrown strips of the crust. The rectilinear gorge of the upper Harlem between Washington Heights and Fordham Heights is continued, so far as its western wall is concerned, some two and a half miles south of the river. It is parallel to the direction of the scarp of the Palisades, and of the Hudson. Besides the cross fractures indicated by the different parts of the Harlem River, which were pointed out by Stevens, several other cross fractures on and about Manhattan Island were pointed out by the same author. Dana also considered that the Manhattanville cross valley was formed by a cross fracture. A considerable number of faults has been definitely established. Their directions correspond in general to the elements in the course of the river channels. The exceptions to this rule are the fissures in the East River east and west of Blackwells Island.

The author went on to cite a number of faults which have been disclosed by numerous borings and tunnels, and, in closing, called attention to the fact that the buried rock-surface in the lower part of the city (south of Twenty-third Street), as well as that below the area of the Harlem flats (north of One Hundred and Tenth Street and east of Eighth Avenue), is characterized by the most abrupt changes of level. In his opinion the area of these portions of the island represents orographic blocks depressed by faults, reefs of gneiss and limestone rising along the Harlem area, while reefs of gneiss alone characterize the southern district.

Professor Hobbs' paper was discussed briefly by Professors Kemp, Dodge and Stevenson, and it was evident that the author's theory would not be accepted without considerable further investigation.

At the outset of his paper on Bingham Cañon, Professor Kemp stated that the article was not a formal one for publication, and that he did not wish to forestall in any degree the forthcoming Bingham folio by Mr. Boutwell, of the United States Geological Survey. He then described the geological formations in the vicinity of large mines. These formations embraced the great section of quartzite with smaller exposure of limestone, and with intruded masses of eruptive rocks which range from pronounced porphyries to granites. At least three kinds of eruptives can be distinguished. The author described in outline the faults and geological relations of the ores, and stated that the ores especially favored the contact of the eruptive rocks with the quartzites. The evidences of contact metamorphism between the porphyries and the limestones were commented upon. The ores in the great porphyry dike on the claims of Colonel Wall were described, and were stated to be secondary in their origin—that is, they were probably introduced in solution into a mass of crushed eruptive rock. The data for the paper were gathered in connection with the field instruction given to a class of students the past summer. The paper was illustrated by means of lantern slides, maps and specimens.

In accordance with the provisions of the new constitution of the Academy, the officers of the Section for the year 1903 were elected at this meeting. They were: *Vice-President and Chairman,* Professor James F. Kemp, of Columbia University; *Secretary,* Dr. Edmund O. Hovey, of the American Museum of Natural History.

EDMUND O. HOVEY,
Secretary.

THE NEW YORK ACADEMY OF SCIENCES. SECTION OF ASTRONOMY, PHYSICS AND CHEMISTRY.

AT the meeting of the Section on November 3, Mr. G. B. Pegram read a paper discussing some experiments of his on the electrolysis of solutions of radioactive salts, in course of which he found that when a solution of a thorium salt is electrolyzed, using platinum electrodes, a temporary radioactivity is imparted to the anode rather than to the kathode, which is remarkable in view of the fact that in the air near dry thorium compounds a negatively charged body, corresponding to the kathode, becomes radioactive, while a positively charged body, corresponding to the anode, is not made active. The activity of the anode used in the electrolysis of a thorium nitrate solution can become much more intense, for a given extent of surface, than that shown by a thick layer of thorium oxide.

The solution under electrolysis rapidly loses its power of imparting radioactivity, so that after four hours of electrolysis with a current of half an ampère, a solution of 20 g. of thorium nitrate in 100 c.c. water had lost 95 per cent. of its power of imparting activity to the anode. This radioactivity of the anode increases for a while after being taken out of the solution, then its intensity falls off at the rate of half its value in eleven hours, which has been shown by Professor E. Rutherford to be the rate of decay in the case of surfaces made active by exposure to the emanation from a dry thorium compound. The radiation is not homogeneous, as is shown by a study of its absorption by successive layers of metal foil.

The activity of the anode seems to increase directly with the concentration of the solution for short periods of electrolysis, but its relation to the current strength and the duration of the electrolysis appears to be less simple.

Solutions containing radium impart activity to both anode and kathode, but this activity decays very rapidly, falling off half its value in about 35 minutes.

S. A. MITCHELL,
Secretary of Section.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY.

THE society held its 143d meeting Tuesday evening, November 11, in Person Hall, University of North Carolina.

Dr. J. E. Mills presented a paper on a 'Suggested Modification of the Law of Dulong and Petit,' in which he stated that if γ denote the ratio of the specific heat of a gas at constant pressure to the specific heat at constant volume, it was shown that γ could be defined in terms of the translational energy of a molecule and the internal energy of the molecule. Hence γ has a meaning for liquid and solid bodies capable of a physical interpretation. Upon this basis there was deduced an equation governing the specific heat of a body and applicable to the solid, liquid or gas. The deduced equation holds so far as measurements have been made. If the theory be true it will explain certain discrepancies and extend the law of Dulong and Petit.

Dr. W. C. Coker spoke of a 'New Species of Mosquito.' In abstract he stated that, while studying the mosquitoes of South Carolina in the summer of 1901, larvæ of peculiar appearance were found in a small pool near a well, and brought into the house. After about three days imagoes of both sexes emerged which proved to be of a new species. They were taken alive to Washington and there studied by Mr. D. W. Coquillett, who describes them as a species of *Psorophora.* He gives them the name *P. howardii* in honor of the well-known entomologist, Dr. L. O. Howard.

Eggs of this species obtained by Dr. Howard from the individuals taken to Washington proved to be practically identical with those of *P. ciliata* procured by Dr. Coker in South

Carolina for the first time. To get the eggs of *P. ciliata* the following method was used: A horse was driven into a low place inhabited by these insects and from him specimens loaded with blood were transferred to a jar. They were then put into a tin bucket with a little water in the bottom and covered with netting. They were fed daily with blood from the hand, and after about five days their eggs were found in the water. The eggs lie separately, like those of *Anopheles*. Contrary to expectation and report, *Anopheles* was found breeding abundantly in a barrel.

Dr. J. E. Duerden gave an account of his work on 'Boring Algæ as Agents in the Disintegration of Corals.' The corolla of about thirty species of West Indian corals, decalcified in the course of a morphological study of the polyps, all yielded a fluffy mass made up of filamentous algæ. The algæ were present in greatest number and variety in the older dead parts of corals, especially in so-called 'rotten coral,' but were also found throughout the part of the skeleton directly clothed with the polypal tissues, the only exception being at the tips of rapidly growing branches. The filaments occurring most frequently belong to two species of green algæ and a red alga; where present in quantity the former give a green color to the freshly macerated corallum, and the latter a pink tinge. Similar boring algæ were also obtained from many Pacific corals.

The algæ attack the calcareous skeleton of corals in the early stages of development, and their ramifications keep pace with its growth. Penetration of the hard coral is evidently affected by chemico-physical means, and their presence in such abundance results in a serious corrosive action, both superficially and internally; when assisted by other boring organisms, such as sponges and molluscs, it must lead to the rapid disintegration of dead coral blocks. Attention was drawn to the bearing of such disintegration upon the various theories associated with the formation of coral reefs.

CHAS. BASKERVILLE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE KINETIC THEORY AND THE EXPANSION OF A COMPRESSED GAS INTO A VACUUM.

MR. FIREMAN, in his reply to my note regarding his communication to the American Association, states that I misread his abstract, and that it was on this account that I failed to understand its contents.

My difficulty was not in understanding the contents, but in understanding how they explained the facts, or why this picturesque conception of a sorting out of the fast and slow molecules without the aid of Maxwell demons, was in any way deemed necessary to the explanation of the heating and cooling of the gas.

Neither Natanson's elaborate quantitative treatment nor what Mr. Fireman calls his simple qualitative explanation appears to be necessary to account for the heating and cooling in the two receivers, in spite of Mr. Fireman's assertion that the explanation commonly given is unsatisfactory.

Mr. Fireman appears to have overlooked the fact that, when a compressed gas passes from a receiver into an exhausted chamber, there is, in addition to the molecular motion, a motion of the gas as a whole, *i. e.*, a mass of the gas is given a motion of translation, which is superimposed on the molecular motion.

To originate this motion requires an expenditure of energy, and a consequent lowering of temperature results. The matter is fully treated in the works of Clausius, Maxwell, Kelvin and Meyer, where it is shown that when a mass of gas is set in motion by its own expansion, the mean molecular velocity becomes less and the temperature is lowered; since the mean velocity is less, the component of molecular perpendicular to the direction of flow is less, and consequently the pressure in this direction is less than in the case of the gas at rest. This accounts for the cooling in the compression chamber.

The heating of the gas in the second receiver is to be referred to the same causes as the heating of the gas under the piston in the case of compression.

Mr. Fireman has difficulty in understanding how a higher average molecular velocity,